Below is transcript for Devin Lea's talk titled "Property resident-initiated flood zone removals in the United States National Flood Insurance Program", which was recorded for the Kasperson Award Session as part of the Hazards, Risk, and Disasters Specialty Group talks for the American Association of Geographers Meeting 2020.

Link to video here: https://studio.youtube.com/video/Ak0eBjqdMnA/edit

Hey everyone, welcome to this talk about property resident-initiated flood zone removals in the United States National Flood Insurance Program. My name is Devin, and this talk is being recorded as part of the Kasperson Award series talks for AAG 2020.

So, there are at least three areas of research that have inspired the project I'm going to talk about today. And you can see them listed here: metrics to study vulnerability to environmental hazards, the inequalities to access to flood hazard protection, and knowledge production of flood hazard, stemming out of more recent ideas as well, like Critical Physical Geography, which has been a big inspiration driven me towards this present project. But what I want to work on and argue today is that putting those pieces together hasn't happened before, so geographers have been under attendant to these links between predicting flood hazard and then how in turn that impacts vulnerability.

And I want to use the United States National Flood Insurance Program to study this, but also because of some societal benefits that we can examine. So, if you're not familiar, in the National Flood Insurance Program, Flood Insurance Rate Maps, so just flood maps, are used to set insurance premiums and are revised over time by technical experts. So, people like engineers and hydrologists. And, specifically in this talk we'll focus in on these flood zones that known as the Special Flood Hazard Area, or areas of one percent or greater chance of flooding annually based on the historical observations used to predict those flood zones. And these are the highest hazard flood zone on Flood Insurance Rate Maps. So, here is an example. Over on the right-hand side we can see the light blue are all the Special Flood Hazard Areas for the state of Florida, which we will examine in this talk. And I also want to note here that the Special Flood Hazard Area also have several sub-flood zones to them and that make them up, and those are determined by how intensive of a study or what kinds of methods were used, like what hydrological and hydraulic methods were used. And that will become important, I'll kind of come back around to that at the end of the talk, but for now we'll focus on just the Special Flood Hazard Area.

So, property residents, so what I'll term as these people who reside in these Special Flood Hazard Areas, can also…once these maps are set, can also hire independent experts to do essentially a review of these flood studies [that produce FIRMs] and attempt to provide some sort of new data that shows that their property actually should be outside of the Special Flood Hazard Area. So, they go from being inside to outside. And, I'll show you this map again later on, but this is a much more zoomed in version of that prior map on the last slide. Once again we have the blue of the Special Flood Hazard Area, but we can also see the individual buildings, individual tax lots, and these dots, these two black dots, that are showing approved appeals for these individual properties, which are known as Letters of Map Amendment, and which we will be looking at in this presentation.

Because we can assume that property residents pursue Letters of Map Amendment because having a property moved outside the Special Flood Hazard Area means that they will pay lower insurance premiums for the same coverage of damages in the event of a flood. And there is anecdotal evidence, so there are some news articles I'm drawing on, that have suggested that it's the wealthy who are taking

advantage of this, that it's the wealthy who are able to remove their properties from the Special Flood Hazard Area. While those who do not have the socio-economic means are not able to do that. But, there's hasn't been any real analysis of this.

And I would argue this is important to study because we could think that inequality will be exacerbated if socio-economically advantaged property owners can remove their properties more often, because in the long term that means they are also paying less money into the program [NFIP] through insurance premiums, while the more marginalized are either unable to remove themselves out so they are paying higher insurance premiums, or they may be forgoing having insurance at all more often.

So, the research questions that drive this then are twofold. We have "what is the spatial distribution of successful LOMAs in Florida", and then "what is the relationship between, specifically successful residential LOMAs in Florida, and socio-economic variables?" at both at individual property scale and census tract scales.

So, there's a number of data sets I'm using here. Some of the Florida data coming from the US Census Bureau, and some from FEMA's Map Service Center website. But also, the GIS buildings coming from a Microsoft an open access layer, or open data layer. And then the tax lots coming from Florida Department of Revenue, and American Community Survey Data from American Factfinder. All of this is out there and freely available, and I compiled it to be able to conduct this research.

So I'm going to walk you through the methods here. For question 1, part of the reason I chose Florida to show here is because about one-third of all National Flood Insurance Program policies are in Florida. So it follows there are also going to be a lot of Letters of Map Amendment. And what I'm going to assume here is a null hypothesis, or just this assumption, that LOMA distribution is going to be weighted by the number of buildings in the Special Flood Hazard Area per Florida census tract, So, essentially if we spread them [LOMAs] out evenly as distributed by the number of buildings in the Special Flood Hazard Area, how close does that actually match up to observed [LOMAs] is what I'm asking here to determine a spatial distribution. So, just simply I'm going to sum the count of all the LOMAs and the count of all buildings in the Special Flood Hazard Area for all the census tracts and divide the former by the latter to get a ratio which I multiplied by the number of buildings in each census tract, the total number of buildings in each census tract to calculate predicted LOMAs [NOTE: this was misspeak, I meant to say the number of buildings in the Special Flood Hazard Area for each census tract to predict LOMAs]. Then I subtract the observed minus the predicted to get a residual, to figure out how close was the observation to this weighted prediction that tells us what we might expect [for the number of LOMAs].

But Florida is also used because there is this statewide GIS property-scale data set from the Florida Department of Revenue. I'm working on doing this at a statewide scale, but I'm going to show you just a case study, so I'm going to focus in on Palm Beach county which is highlighted here on the right.

So, we start zooming in and we can see more of the census tracts [misspeak: I mean to say "tax lots"], we can the greater density of them on the east side of Palm Beach county.

And as we continue to zoom, we see now more individual tax lots here, and then we can start layering on those layers.

So here we bring back in that Special Flood Hazard Area in the blue.

And then back with the buildings, the individual black lots, and again the Letters of Map Amendment. So, for question two, what I did was comparing… I was actually pulling out the property values that are tied to these individual tax lots. The census tracts are shown here in the black outlines. So, for the individual tax lots, pulling out the property values for properties that had LOMAs and comparing those to all the properties that were in the Special Flood Hazard Area, and comparing those two distributions to properties that were outside the Special Flood Hazard Area, so looking at those three side by side and seeing the differences of the distributions of those values.

So, to show some of the results here for question. So, by census tract, this image is showing us that difference between the observed LOMAs minus the LOMAs that gives the residuals. We have negative values, or these blue tones, the darkest being the largest negative values, where those are having much fewer observed LOMAs than predicted. Meaning there are a lot of buildings in the Special Flood Hazard Area, but very few LOMAs, relatively. And then, opposite of that, we have the positive values. The greatest positive values where we have higher observed LOMAs than would be expected, so meaning there are relatively a lot of observed LOMAs compared to the number of buildings in the Special Flood Hazard Area for these places.

So, we see that there are a variety of patterns here, but one that I want to point out. Most frequently along the coast in many areas I found that generally there are negative values, some of them moderate and some larger. Compared to generally positive values often falling inland. So we are seeing that in this example for south Florida.

But the pattern also generally hold as we move into central Florida. With this example, when we look at the coast we see around zero or negative values in many places, where inland there are around zero values or positive values. There are exceptions to those cases, but generally we see that pattern in many places.

Then to research question two, just doing some data exploration. So, for all census tracts in the state of Florida, again we're comparing those residual LOMAs to some of these socio-economic factors, so median income in this picture, increasing from left to right. Here we some of the highest positive values, some of those outliers that stick out the most in the middle of the value spectrum. Otherwise, everything else falling down here, but a lot of the biggest changes in the middle of the values for median income across these census tracts.

Percent below poverty here. We see some of the largest positive values at lower percent poverty, but again, in this large aggregation with everything together we are not seeing any strong trends.

But to focus in more at the individual property scale. Again, I have this one case example for Palm Beach county. And I'm working to see if this is the same across the state, because one thing I found interesting to pull out here is when examining just the property values of the LOMAs on the left side of the table, and compared to all property values for all properties that were in the Special Flood Hazard Area and verses all properties that were outside the Special Flood Hazard Area on the right. We can see when comparing the quartiles, so the first quartile, median, third quartile, we see higher values for the LOMAS compared to properties that were either inside or outside the Special Flood Hazard Area that didn't have LOMAs.

And similarly when we now standardize where we have this percentile of LOMA property values, essentially taking that out the property value distribution of all properties in the Special Flood Hazard Area. We see that most of these fall in the forty to seventy percent, percentiles, here. So, not many that are lower, and not many that are higher.

So, to wrap up in these next couple minutes talking about what, or hypotheses what might be causing these distributions. And I will also be conducting interviews with FEMA officials, and the hydrologists and engineers who approve these changes to be building upon these results [to better help understand why]. But in terms of the spatial distribution of LOMAs, there is the question if the coastal areas simply more difficult to remove from the Special Flood Hazard Areas because of the physical processes going on there. Or is it that there are certain types of flood zones that are easier to change for flood hazard prediction. Since there are different types of sub-flood zones [of the Special Flood Hazard Area], so is it something that has to do with those. Or, because there are different types of LOMAs. So, some of them rely on changing hydrologic or hydraulic data, while some of them rely on physical topography change and bringing in fill dirt. So does that have an impact? That all still needs to be worked out more, and I can talk more about that in our Q&A session.

But also for question two, for the LOMAs, are they being accessed more mostly by properties in the middle of that property value spectrum, taking property value there as a proxy. So, compared to an idea like facilitation where it's frequently the most wealthy who are facilitating and using social protections to keep themselves living in hazardous places. Is it then that people in the middle of the property value spectrum are getting more 'bang for their buck', or does that vary geographically across the state of Florida depending on who is residing in the Special Flood Hazard Area.

So, I just want to show you my references here. And I want to thank you for watching and I'm looking forward to having a good Q&A session with all of you on Monday. Thanks!